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A Theoretical Model for Determining Turbine Flowmeter Sensitivity

A lack of facilities for the calibration of turbine-type flowmeters at their application use-flowrates and in their application use-fluid necessitates the use of an extrapolation of available calibration data to use conditions in the absence of in-place calibration. For such an extrapolation to have any validity, an analytical model of the subject flowmeter must exist to guide in the selection of the extrapolation form.

Analysis is, therefore, performed to develop an expression for flowmeter performance that includes the effects of fluid friction, bearing drag, and magnetic drag upon helical rotor design. A direct solution is developed to describe fluid friction effects. Magnetic and bearing drag effects do not lend themselves to direct solution. However, expressions are derived for the form of the drag torques; for example, bearing drag torque is found to be quadratic in stream velocity.

Notes:

1. No empirical data have been generated in confirmation of the theory presented.
2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B67-10179

Patent status:

No patent action is contemplated by NASA.

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